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DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

Letter
Circular
303

SOUND ABSORPTION COEFFICIENTS OF THE MORE COMMON MATERIALS.

May 15, 1931.

The following figures have been obtained at the Bureau of Standards for the sound absorption coefficients of a number of materials now on the market as acoustic correctives. Figures are also given for the absorption of an audience seated in chairs of different kinds. The results have all been obtained by the reverberation method.

Acoustic correctives may be classified in general as fibrous materials, tiles and acoustic plasters. Materials of the first two classes are usually supplied in a form which needs no special experience for its application. With acoustic plasters the case is different. If improperly applied the coefficient of absorption may be considerably less than the values here given.

It is not necessarily the case that the materials of highest coefficient are the most advantageous. When there is room enough to apply the requisite quantity, a material of low coefficient will give better results than one of higher absorption, due to the more uniform distribution of material.

For the foregoing reasons it is advisable in drawing up specifications for auditoriums to lay emphasis upon the reverberation time desired rather than upon coefficients of material. See Bureau of Standards Circular No. 380 entitled Architectural Acoustics, which may be obtained of the Superin-

tendent of Documents, Government Printing Office, Washington, D.C.

Additional details regarding any of the materials mentioned in this Letter Circular will be furnished on application.

Material	Absorption Coefficients for Frequencies 128	256	512	1024	2048	Date
ACOUSTEX, 1" thick, spray painted	.16	.24	.51	.71	.72	1930
" 1 1/2" " " "	.22	.31	.59	.73	.73	1930
ACOUSTIC LIME PLASTER, Finishing Lime Assoc. of Ohio, 3/4" thick	.17	.23	.28	.36	.64	1930
ACOUSTOLIC (Maftex) nailed on 2x4's, spaced 2 ft. on centers						
Without surface treatment	.44	.24	.31	.44	.48	1930
Tinted with water soluble aniline color		.29	.28	.41		1930
Tinted with water color paint	.40	.33	.31	.38	.37	1930
AKOUSTOLITH TILE, Grade D, 1" thk.	.08	.13	.25	.54	.67	1930
" " " D, 2" "	.15	.26	.59	.74	.52	1930
" " " B, 1" "	.10	.14	.28	.65	.73	1929
" " " C, 1½" "	.12	.19	.44	.61	.66	1930
" " " C, 2" "	.19	.26	.53	.64	.70	1930
AKOUSTOLITH PLASTER, 1/4" thick	.13	.21	.19	.23	.33	1931
ARBORITE, on 13/16" x 2" furring strips, spaced 12" on centers						
Low density material, sanded surface	.21	.48	.34	.31	.41	1930
Regular material, sanded surface	.16	.40	.27	.29	.39	1930
BALSAM WOOL, 1" thick, scrim facing	.18	.36	.55	.65	.67	1928
CELOTEX, Type B	.16	.26	.40	.62	.64	1928
" " BB	.19	.42	.61	.72	.76	1928
" " BB painted	.19	.34	.63	.75	.77	1930
FLAXLINUM, 1" thick	.09	.31	.62	.77	.69	1930
" in TMB Tile, on 13/16" x 2" furring strips, spaced 16" on centers						
1/2" Flaxlinum	.11	.19	.58	.68	.69	1930
1" "	.17	.34	.61	.72	.68	1930
1/2" and 1" Flaxlinum	.32	.46	.67	.69	.71	1930
2 1" layers "	.41	.59	.70	.72	.74	1930
HACHMEISTER-LIND ACOUSTIC PLASTER, stippled with pins 1/2" deep	.16	.19	.25	.36	.44	1930
KALITE PLASTER, 3/4" thick, on metal lath with wood studs, no base coat	.32	.65	.63	.67	.83	1931

Material	Absorption Coefficient for Frequencies					Date
	128	256	512	1024	2048	
MACOUSTIC PLASTER, 1/2" thick stippled with large pins, perforations 1/2" deep	.06	.17	.33	.56	.58	1931
DITTO, Special Plaster, hardened surface	.08	.28	.47	.55	.55	1931
NASHKOTE A, 1/2" thick	.05	.13	.25	.26	.20	1929
" A, 3/4" "	.09	.16	.27	.30	.23	1929
" A 1" "	.12	.20	.33	.33	.28	1929
" B-332, 1/2" thick	.09	.15	.31	.52	.74	1929
" B-332, 3/4" "	.12	.21	.40	.63	.81	1929
" B-332, 1" "	.19	.26	.51	.73	.89	1929
" A, 1/2" thick, perforated	.08	.15	.43	.62	.65	1929
" A, 3/4" " "	.11	.21	.51	.68	.71	1929
" A, 1" " "	.13	.26	.58	.73	.77	1929
REVERBOLITE PLASTER, stippled with large pins, 1/2" thick	.07	.15	.34	.47	.65	1930
SABINITE PLASTER, Regular	.13	.22	.22	.25	.31	1931
" " Hydraulic	.14	.24	.27	.38	.49	1931
SANACOUSTIC TILE, Rock Wool filler, 1 1/4" thick	.17	.41	.82	.94	.85	1930
SOUNDEX, 1 3/16" thick, spray painted	.10	.22	.36	.53	.72	1929
SOUNDEX, 1 7/16" thick, spray painted	.21	.26	.48	.68	.75	1929
THERMATEX, on 13/16" x 2" furring strips, spaced 12" on centers	.30	.39	.34	.43	.53	1930
THOS.MOULDING COMPANY All samples mounted on 13/16" x 2" furring strips, spaced 16" on centers.						
TMB LAMINATED ACOUSTIC TILE spray painted with lacquer						
1" thick	.17	.41	.63	.69	.74	1931
1 1/2" thick	.27	.58	.72	.77	.81	1931
TMB FIBRE TILE						
1/2" thick unpainted	.07	.15	.28	.51	.71	1931
1" " "	.12	.22	.56	.79	.80	1931
1 1/2" thick "	.17	.36	.78	.85	.85	1931
1" thick spray painted with lacquer	.11	.25	.62	.81	.73	1931
TMB METAL TILE filled with Gimco Rock Wool pad, weight 1.6 lbs.per sq.ft.	.39	.50	.86	.90	.81	1931
DITTO, filled with 1½" TMB fiber tile	.16	.47	.79	.81	.75	1931

Material	Absorption Coefficients for Frequencies 128	256	512	1024	2048	Date
U.S.GYPSUM TILE						
1/2" thick	.09	.20	.48	.64	.66	1931
3/4" "	.13	.28	.61	.73	.73	1930
1" "	.18	.38	.64	.73	.73	1930

The coefficients given in the above table represent the fractional part of the energy of a sound wave which is absorbed at each reflection.

Audience seated in chairs of various types.

A = cane seat chairs, open back

B = theatre chairs, box spring seat, heavily padded back

C = same as B, but single layer of padding on back

D = Church pews, seating five.

Absorption per person[1]	Frequencies 128	256	512	1024	2048
Women without coats, A	0.7	1.3	2.3	3.6	4.6
Women with coats, A	1.3	2.4	4.0	5.8	6.7
Men without overcoats, A	1.3	2.1	4.1	5.5	7.4
Men with overcoats, A	2.3	3.2	4.8	6.2	7.6
Mixed Audience, B			3.9	4.7	
Empty seat, B		3.4	3.0	3.3	3.6
Mixed audience, C		3.5	4.1	4.9	4.2
Empty seat, C		3.0	2.5	2.9	3.1
Mixed audience, D		2.7	3.3	3.8	3.6

(1) These figures are numerically equal to the number of square feet of a material having unit absorption, which would absorb the same amount of sound energy.